

COVID-19 knowledge, attitude and awareness among preclinical and clinical dental students: An online-based cross-sectional survey.

Conocimiento, actitud y conciencia de COVID-19 entre estudiantes de odontología preclínica y clínica: Una encuesta transversal en línea.

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Abstract: Objective: The aim of this study was to assess the understanding and perception of Coronavirus Disease 2019 (COVID-19) among the undergraduate preclinical and clinical dental students within Pakistan. **Material and Methods:** An online survey was developed by the researchers and conducted amongst the undergraduate students at various dental colleges of Pakistan. A pretested questionnaire was used and distributed using social media platforms. The questionnaire consisted of demographics, health status, perception related to general hygiene, understanding and learning attitudes of dental students. Knowledge scores and the attitude responses were compared with the demographics using independent t-test, one-way ANOVA and chi-square, as appropriate. **Results:** A total of 800 undergraduate dental students responded to the survey, out of which 304(38%) were males and 496(62%) were female students. Students in pre-clinical years were 600(75%), while 200(25%) students were in the clinical years. The knowledge of clinical students regarding COVID-19 was statistically higher (4.71/6), compared to the students in pre-clinical years (4.49/6) ($p=0.004$). Both groups showed adequate knowledge regarding the route of transmission, symptoms and origin of COVID-19, and COVID-19 being a threat to life. Clinical students did not want to re-use the face mask (75%), compared to the preclinical students (68%) ($p=0.048$). Students in clinical years reported more awareness regarding the recommended hand washing technique during COVID-19 ($p<0.001$). **Conclusion:** It can be concluded that dental students in clinical years have adequate knowledge regarding the COVID-19 as compared to the preclinical students. The study identifies all areas where preclinical and clinical students lack basic knowledge. This should be compensated by arranging different webinars and online courses to increase the understanding of both clinical and preclinical students during the pandemic.

Keywords: attitude; awareness; COVID-19; knowledge; Pakistan; students, dental.

Resumen: Objetivo: El objetivo de este estudio fue evaluar la comprensión y la percepción de la enfermedad por coronavirus 2019 (COVID-19) entre los estudiantes de pregrado de odontología clínica y preclínica en Pakistán. **Material y Métodos:** Los investigadores desarrollaron una encuesta en línea que se llevó a cabo entre los estudiantes de pregrado de varias facultades de odontología de Pakistán. Se utilizó y distribuyó un cuestionario, previamente probado, a través de plataformas de redes sociales. El cuestionario comprendía datos demográficos, estado de salud, percepción relacionada con la higiene general, comprensión y actitudes de aprendizaje de los estudiantes de odontología. Las puntuaciones de conocimiento y las respuestas de actitud se compararon con los datos demográficos mediante la prueba t independiente, ANOVA de una vía y chi-cuadrado, según corresponda. **Resultados:** Un total de 800 estudiantes de odontología de pregrado respondieron a la encuesta, de los cuales 304 (38%) eran hombres y 496 (62%) eran mujeres. Los estudiantes en los años preclínicos eran 600 (75%), mientras que 200 (25%) estaban cursando años clínicos. El conocimiento de los estudiantes de clínica sobre COVID-19

fue estadísticamente mayor (4.71/6), en comparación con los estudiantes en años preclínicos (4.49/6) ($p=0.004$). Ambos grupos mostraron un conocimiento adecuado sobre la vía de transmisión, síntomas y origen de COVID-19, y que COVID-19 es una amenaza para la vida. Los estudiantes en fase clínica no querían reutilizar la mascarilla (75%), en comparación con los estudiantes preclínicos (68%) ($p=0.048$). Los estudiantes en años clínicos informaron más conciencia sobre la técnica de lavado de manos recomendada durante COVID-19 ($p<0,001$). **Conclusión:** Se puede concluir que los estudiantes de odontología en años clínicos tienen un conocimiento adecuado sobre el COVID-19 en comparación con los estudiantes en años preclínicos. El estudio identifica todas las áreas donde los estudiantes clínicos y no clínicos carecen de conocimientos básicos. Esto debe compensarse organizando diferentes seminarios web y cursos en línea para aumentar la comprensión de los estudiantes clínicos y no clínicos durante la pandemia.

Palabra Clave: concienciación; actitud; COVID-19; conocimiento; Pakistán; estudiantes de odontología.

INTRODUCTION.

On the 12th of December 2019, the novel coronavirus infection first appeared in the form of suspected cases of pneumonia of unknown origin, which was later linked to the wet animal market in Wuhan, China.¹

However, on the 12th of January 2020, the World Health Organization (WHO) transitionally named the responsible virus as the 2019 novel coronavirus (2019-nCoV). The disease was later named as Severe Acute Respiratory Syndrome-2 Coronavirus (SARS-2 coronavirus) on the 11th of February 2020.² Due to rapid spread of the disease across country borders, the COVID-19 epidemic was officially declared a pandemic by the WHO on 11th of March 2020.² COVID-19 pandemic has affected the clinical training at various dental schools and dental clinics across the globe, with initial restrictions limiting services to providing only emergency and urgent dental care.³ Due to the unique traits of dental settings, the risk for cross-infection is high between dental practitioners and patients.⁴ It has been reported that the risk of spreading the virus is higher amongst the dental professionals.⁵

Dental treatments generate large amounts of aerosols and this along with the close proximity of the dentist to the patients increases the chances of acquiring infection within the dental offices/clinics.⁶ This novel virus is also found in the saliva of the infected person and is known to survive in the droplets for hours and on various surfaces for days.^{7,8} Hence, the standard protective chair side measures that were initially opted as a part of daily routine practice seemed insufficient to halt the spread of the virus, especially when the patients under treatment were in their incubation period or were unaware about acquiring the infection.⁴

To overcome the increasing number of cases, the Pakistani government reinforced safety awareness pro-grams and implemented a lockdown to reduce the spread of the virus. During that period of lockdown, routine dental practices were also suspended to stop the transmission of the disease. Likewise, WHO recommended self-isolation, social distancing and lock-downs as important measures to prevent the spread of the virus.

Lack of adequate knowledge about COVID-19 among the dental students may lead to diagnostic delays, the spread of the disease and inadequate infection control practices. Dental care providers must be updated regarding the knowledge of COVID-19 and infection control strategies.⁵

The current study aims to assess the understanding and perception of pre-clinical students (first and second year) and clinical students (third and fourth year), regarding COVID -19 amongst the dental colleges of Pakistan.

MATERIALS AND METHODS.

Study design and population

This cross-sectional, multicenter digital survey was carried out amongst the undergraduate dental students studying in various dental schools across Pakistan. Convenience sampling was used in the study. The participants included pre-clinical dental students that had not been exposed to clinical rotations (first and second year) and the students who had started their clinical rotations (third and fourth year).

Ethical approval

The study was carried out according to the Helsinki Declaration. Ethical permission for the study was obtained from the Institutional Ethical Review Committee of the Bahria University Medical and Dental College, Karachi, Pakistan (ERC 55/2020).

Questionnaire

An online questionnaire was developed using Google Forms (Alphabet, Mountain View, CA, USA) with questions regarding the participating students' understanding and perception of the COVID-19 pandemic. The questionnaires were kept anonymous, for the privacy and confidentiality of all the information stated in the research. It was distributed through social media to the students across the country.

Data was collected from May through July 2020. The questionnaire developed for the current study was initially pretested and validated. A pilot study was executed using a small sample of dental students (n=20). The records from the pilot study were not used in the final investigation.

The link of the questionnaire was shared with under-graduate students via WhatsApp by student affairs administration. The form was also shared

with the dental students on Facebook through the investigators contact list. The participants were requested to further share the survey link with their peers. On clicking the link, the participants were first directed to the consent section of the study, this was followed by the questionnaire. Data related to the demographics was first collected. The next part of the questionnaire was further subdivided into five sections.

These sections included questions related to smoking, medical health of the individual, oral hygiene practices, frequency, and duration of handwashing, the temperature of the water used for handwashing and frequency of touching one's face. Knowledge regarding the mode of transmission of COVID-19 was assessed along with the use of personal protection equipment's (PPE) and related protocols. The questionnaire also evaluated general learning attitudes of the participants towards the current pandemic.

Inclusion criteria

Undergraduate dental students enrolled in the first, second, third and fourth year at different dental colleges of Pakistan were included in the study. As it was an online survey, only participants having internet access were able to participate in the study.

Exclusion criteria

Graduate dental students doing their house job (internship) and postgraduate dental trainees were excluded from the study.

Statistical Analysis

SPSS v22 IBM software was used for analytical purposes. Descriptive statistics (frequency, percentages, and mean SD) were calculated. The normality of data was checked by Shapiro-Wilk test and the *p*-values greater than 0.05 suggested that data is following normal distribution. Comparisons of the knowledge score and attitude responses with demographic information were done using the independent t-test, and one-way ANOVA, as appropriate.

The associations between the hygiene awareness with the knowledge status and attitude responses among dental students were described using the chi-square test; a *p*-value less than 0.05 was considered statistically significant. Univariate and Multivariate Regression analysis was used to investigate the factor

Figure 1. Percentage Of Dental Students Afraid Of COVID-19 Pandemic According To Stage Of Training.

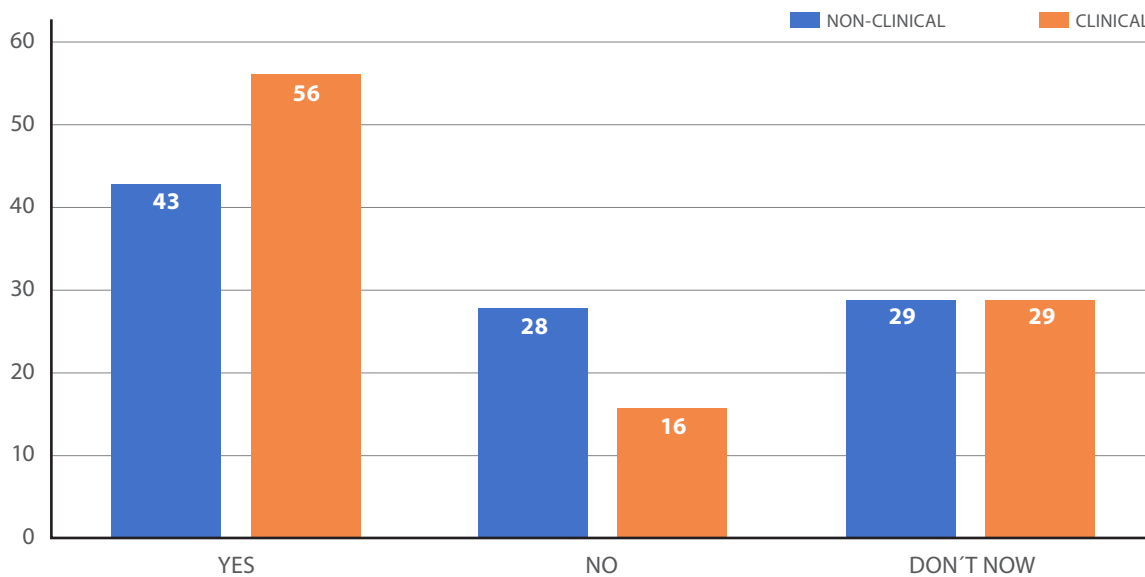


Figure 2. How willing (scale 1-10) are dental students to learn more about the COVID-19 pandemic according to the stage of training.

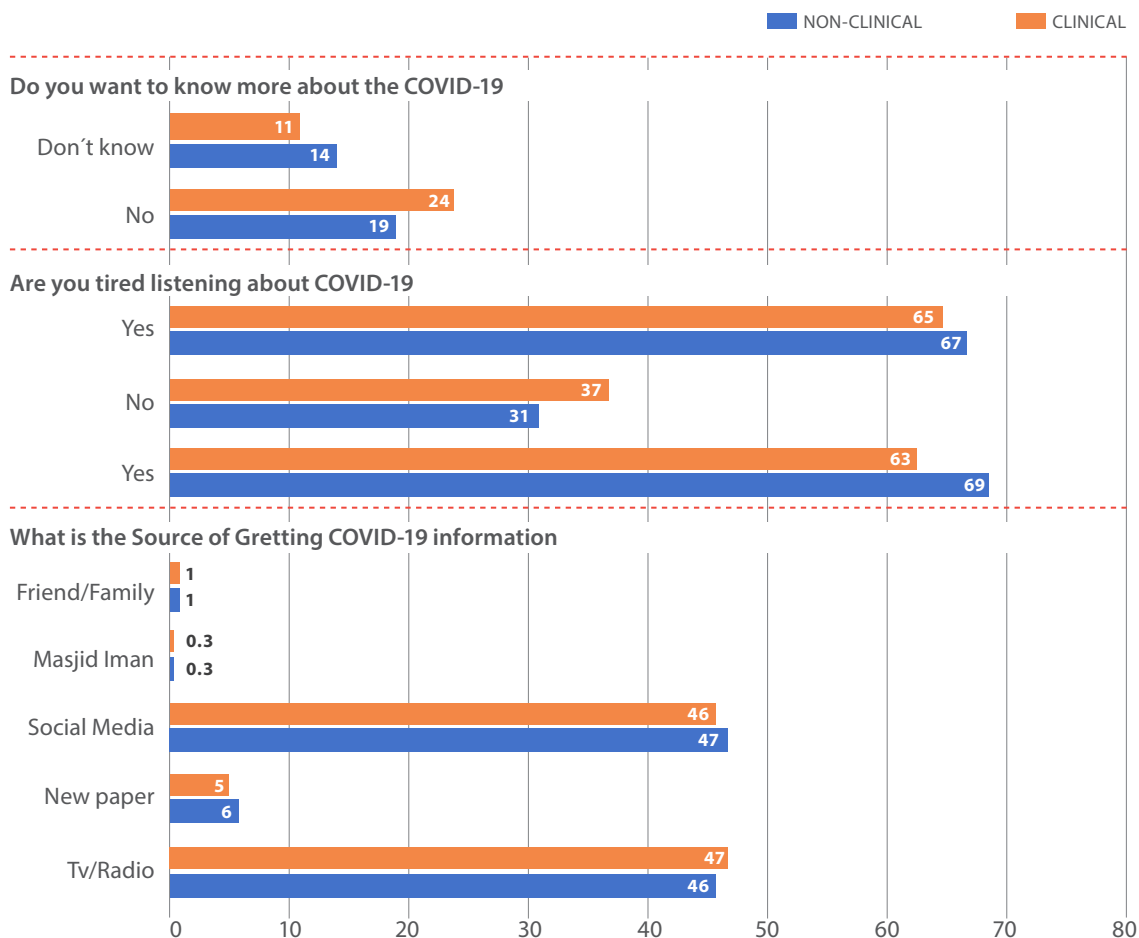


Table 1. Demographic characteristics of dental students included in the Study.

		Non-clinical	Clinical
Age		20.23±2.63	23.79±2.301
Gender	Male	228 (38%)	74 (37%)
	Female	372 (62%)	126 (63%)
Smoking status	Yes	24 (4%)	16 (8%)
	No	546 (91%)	174 (87%)
	Occasional smoker	24 (4%)	6 (3%)
	Past smoker	6 (1%)	4 (3%)
Allergies	Yes	12 (2%)	14 (7%)
	No	498 (83%)	138 (69%)
	Seasonal allergy	84 (14%)	46 (23%)
	Medication allergy	6 (1%)	2 (1%)

Table 2. Comparison of knowledge between clinical and preclinical dental students in Pakistan.

Knowledge Questions	Response	Non-Clinical	Clinical	p-value
What are the transmission routes of COVID-19?	Wrong Answer	84(14)	38(19)	0.055
	Correct Answer	516(86)	162(81)	---
What are the symptoms of COVID-19?	Wrong Answer	342(57)	100(50)	0.068
	Correct Answer	258(43)	100(50)	---
In which country did the COVID-19 disease first start?	Wrong Answer	12(2)	2(1)	0.466
	Correct Answer	588(98)	198(99)	---
Can we reuse a face mask?	Wrong Answer	192(32)	50(25)	0.048*
	Correct Answer	408(68)	150(75)	---
How many days does the quarantine last?	Wrong Answer	216(36)	46(23)	0.001*
	Correct Answer	378(63)	154(77)	---
Do you agree that COVID-19 is a real life threatening disease	Wrong Answer	42(7)	16(8)	0.668
	Correct Answer	558(93)	184(92)	---

Table 3. Hygiene and Personal Protection Equipment (PPE) Awareness between Non-Clinical and Clinical Students.

Questions	Response	Non-Clinical	Clinical	p-value
How many times do you wash once a your hands with soap?	Day	6(1)	2(1)	0.942
	Twice a Day	24(4)	6(3)	
	Multiple Times a Day	570(95)	192(96)	
How many times do you clean/wash your face?	Once a Day	30(5)	12(6)	0.795
	Twice a Day	66(11)	24(12)	
	Multiple Times a Day	504(84)	164(82)	
Are you aware of the recommended hand washing technique during the current pandemic?	Yes	546(91)	196(98)	0.001*
	No	24(4)	2(1)	
	Not sure	30(5)	2(1)	
Do you agree that COVID-19 is a real-life threatening disease?	Yes	420(70)	146(73)	0.397
	No	42(7)	16(8)	
	May Be	138(23)	38(19)	
When going out do you wear a face mask and gloves?	Yes	528(88)	180(90)	0.725
	No	42(7)	12(6)	
	don't know	30(5)	8(4)	
Why do you wear a face mask/PPE?	Taking care of a person with suspected 2019-nCoV (Coronavirus) infection	102(17)	48(24)	0.05*
	Prevent yourself from catching the disease	36(6)	10(5)	
	Protecting other persons around you	54(9)	10(5)	
	Coughing or sneezing	18(3)	4(2)	
	All of the Above	396(66)	128(64)	

Table 4. Factors Associated With Knowledge Score Of Dental Students, Using Multiple Linear Regression.

Variables	Partial Regression Coefficients			95.0% Confidence Interval for B		
	β-coefficient	Standard Error	t-statistic	Significance	Lower Bound	Upper Bound
(Constant)	4.640	0.310	14.968	0.000*	4.032	5.248
Clinical (vs Pre-Clinical)	0.202	0.091	2.228	0.026*	0.024	0.381
Non-Smoker (vs Smokers)	-0.253	0.121	-2.095	0.036*	-0.491	-0.016
Gender Male	0.012	0.073	.165	0.869	-0.132	0.156
Age (years)	0.004	0.013	.304	0.761	-0.022	0.030

*: significant at 0.05.

associated with the knowledge score. *p*-value 0.10 was considered as cut off significant value for factors in univariate analysis.

RESULTS.

The data consisted of a total of 800 dental students, out of which 304(38%) were male and 496(62%) were female. The overall mean age of students was 21.20±2.95 years with the range from 17 years to 30 years old. The total number of students who were enrolled in the preclinical (non-clinical) years were 600(75%), while 200(25%) were enrolled in the clinical years. The clinical versus preclinical students' distribution with the demographic information (Table 1). Overall, the general knowledge of clinical year students regarding COVID-19 was noted to be statistically higher (4.71/6) as compared to pre-clinical year students (4.49/6) (*p*=0.004). The knowledge related to the transmission route, symptoms & origin of COVID-19, and COVID-19 being a threat to life among clinical and preclinical students was found to be statistically satisfactory but there was no significant difference between the groups (Table 2)

Clinical year students preferred reusing the face mask (75%) as compared to the preclinical students (68%) (*p*=0.048). Regarding the incubation period of COVID-19, 77% of the clinical students answered correctly, while 36% of pre-clinical students gave the wrong answer (Table 2).

Table 3 demonstrates the hygiene and PPE awareness among the clinical and preclinical students. Awareness regarding washing hands with soap multiple times a day and face washing was not significantly different between pre-clinical and clinical students

(Table 3). Students in clinical years had more awareness regarding the handwashing technique during COVID-19 (*p*<0.001).

Taking care of an individual with suspected COVID-19 infection, wearing a face mask and following PPE protocol is practiced more by clinical students (24%) compared to the preclinical students (17%) (*p*=0.05), whereas preclinical students had higher awareness (9%) regarding protecting other infected persons as compared to the clinical students (5%).

Clinical year students felt more frightened (56%) as compared to pre-clinical year students (43%), whereas the same proportion of students said they were not sure about it (29%) (Figure 1) and the difference was statistically significant (*p*<0.001). Social media and television/radio were the biggest sources of getting COVID-19 related information for both the pre-clinical and clinical groups (93%). Preclinical students were more tired of listening to news regarding COVID-19 compared to clinical students.

However, both the preclinical and clinical students reported that they would like to know more regarding the COVID-19 (Figure 2).

A multiple linear regression analysis was performed to check whether the factors such as age, gender, smoking, and level of education (clinical vs preclinical) are associated with the knowledge score of overall dental students. These variables were significantly associated with knowledge score $F(3,428)=0.009$ and R^2 of 12.3% showed predictive accuracy.

Clinical students had better knowledge and there was a significant association with the overall knowledge score ($\beta=0.202$, *p*=0.026). Surprisingly, smokers reported better knowledge than non-smokers ($\beta=-$

0.253, $p=0.036$). Age and gender were not found to be significantly associated with the knowledge score (Table 4).

DISCUSSION.

Dental students either directly or indirectly are affected by different transmissible diseases.⁹ Occupational health along with the safety of practicing Dental care providers should be of paramount importance, to reduce the risk of virus transmission to healthcare students providing primary care to the patients.^{10,11} With the increasing knowledge of viral features, epidemiologic characteristics and clinical spectrum, different treatment strategies are under consideration to prevent, control and stop the spread of the virus.

Our study reported a high level of knowledge amongst the clinical students regarding the COVID-19 pandemic (4.71/6). These findings are in line with a study reported by Hossein *et al.*,¹² who assessed the COVID-19 related knowledge, self-reported preventive behaviors and risk perception among the Iranian medical students during the COVID-19 pandemic. They reported high levels of knowledge (86.96%) and preventive behavior (94.47%) along with a moderate risk perception amongst the Iranian medical students.

This can be attributed to the fact that during the third year of dentistry, students are taught subjects like Oral Medicine and Medicine where they learn in detail about different diseases and hence have higher knowledge.

Dental students play a crucial role in providing dental care to patients. The main route of transmission of SARS-COV-2 during the dental treatment is close contact with the patient along with the generation of aerosols.⁶ Therefore, it is of immense importance that the dental students with minimal clinical exposure have sufficient understanding regarding the transmission route, origin and symptoms of COVID-19. Our study identified that both pre-clinical and clinical students had adequate knowledge with regards to the above-mentioned parameters, but no significant difference was noted between the two groups.

Similar observations have been reported by Khasawneh *et al.*,¹³ who assessed the knowledge and

attitudes of undergraduate medical students regarding COVID-19 in Jordan. All the participants reported an adequate level of knowledge and a positive attitude towards the COVID-19 pandemic. Similarly Khan *et al.*,¹⁴ also found that healthcare workers have better knowledge regarding disease transmission and spread. This can be due to the fact that dental clinical students study different diseases in detail and therefore have greater clinical knowledge.

Adequate understanding regarding the usage of a face mask for protection against COVID-19 was observed among the clinical dental students. These results are in agreement with a Chinese study, where most of the participants preferred using a mask to protect themselves.¹⁵ Another survey conducted by Baloran *et al.*,¹⁶ in the Philippines, reported that 90% of the studied population understood the importance of face masks in providing protection against this viral infection. Additionally, facemask helps not only in protecting the individual wearing it but also helps in halting the spread of the infection.

The knowledge regarding COVID-19 in the participants was reported to be appropriate in the current study. A Nepali study conducted by Jha *et al.*,¹⁷ reported similar findings among the dental students. Hand Hygiene plays a crucial role in providing protection against infections.¹⁸

Despite the relative simplicity of the procedure, compliance within the health care professionals is noted to be as low as 40%.¹⁹

From the current study it has been identified that both studied groups washed their hands multiple times and had followed the recommended hand washing techniques. These results are in agreement with the study led by Gambhir *et al.*,²⁰ who identified that 90% of the participants followed adequate handwashing protocol during the pandemic. Majority of the students from both groups identified COVID-19 as a Life-threatening condition. Similar results have been revealed by Kamate *et al.*,²¹ who also identified that most of the study participants considered COVID-19 as fatal.

This is possibly due to a higher mortality rate with COVID-19. The most common source of information for both groups within the current study was social Media followed by television and radio. Similar results

have been identified by Kamate *et al.*,²¹ where the most common means of gathering information related to COVID-19 was the internet, followed by social media.

Strength and limitations

A high response rate was the strength of the study. The study had some limitations. All the student knowledge was tested only by using a questionnaire. In countries where the epidemic is on the rise, strategies to update health sciences students with proper information related to COVID-19 is of paramount importance. The lacunae noted can be addressed through educational sessions. Similar studies can be undertaken in other medical colleges of the country, especially in nursing and pharmacy colleges.

CONCLUSION.

It can be concluded that dental students currently in the clinical years have adequate knowledge regarding the COVID-19 as compared to the non-clinical students. This study identifies the areas where the non-clinical and clinical students lack basic knowledge.

This should be compensated by arranging different webinars and online courses to increase the understanding of both clinical and non-clinical students during this period of Pandemic.

Future Directions

The results of this study give an idea about the knowledge and awareness of pre-clinical and clinical dental students during the pandemic.

Data obtained from the current study will help in conducting special training workshops and courses to prepare students for managing dental patients with caution, enabling them to protect themselves and prevent further spread of the disease.

Conflict of interests: None declared.

Ethics approval: Study was approved by the Institutional Ethical Review Committee of the Bahria University Medical and Dental College, Karachi, Pakistan (ERC 55/2020).

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